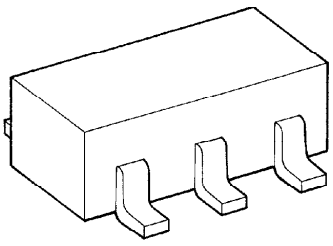
TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4S30F

EXCLUSIVE-OR GATE

TC4S30F contains one circuit of exclusive OR gate.
Since the buffers of two stage inverters are provided for all the outputs, the input / output voltage characteristic has been improved and the noise immunity has been also improved. And increase of transmission time due to load capacity increase is kept minimum.
Wide variety of applications are offerred, such as digital comparators and parity circuits.



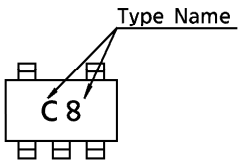
SSOP5-P-0.95

Weight : 0.016g (Typ.)

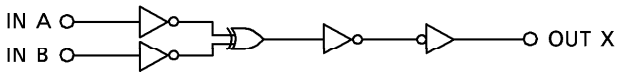
MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	$V_{SS}-0.5 \sim V_{SS}+20$	V
Input Voltage	V_{IN}	$V_{SS}-0.5 \sim V_{DD}+0.5$	V
Output Voltage	V_{OUT}	$V_{SS}-0.5 \sim V_{DD}+0.5$	V
DC Input Current	I_{IN}	± 10	mA
Power Dissipation	P_D	200	mW
Operating Temperature Range	T_{opr}	−40~85	°C
Storage Temperature Range	T_{stg}	−65~150	°C
Lead Temperature (10s)	T_L	260	°C

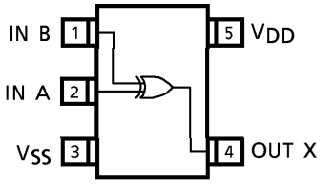
MARKING



LOGIC DIAGRAM



PIN ASSIGNMENT (TOP VIEW)



TRUTH TABLE

INPUT		OUTPUT
A	B	X
L	L	L
L	H	H
H	L	H
H	H	L

961001EBA2

RECOMMENDED OPERATING CONDITIONS (V_{SS} = 0V)

CHARACTERISTIC	SYMBOL		MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	V_{DD}	—	3	—	18	V
Input Voltage	V_{IN}	—	0	—	V_{DD}	V

STATIC ELECTRICAL CHARACTERISTICS (V_{SS} = 0V)

CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	−40°C MIN.	−40°C MAX.	25°C MIN.	25°C TYP.	25°C MAX.	85°C MIN.	85°C MAX.	UNIT
High-Level Output Voltage	V_{OH}	$\|I_{OUT}\| < 1\mu A$, $V_{IN} = V_{SS}, V_{DD}$	5	4.95	—	4.95	5.00	—	4.95	—	V
			10	9.95	—	9.95	10.00	—	9.95	—	
			15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level Output Voltage	V_{OL}	$\|I_{OUT}\| < 1\mu A$, $V_{IN} = V_{SS}, V_{DD}$	5	—	0.05	—	0.00	0.05	—	0.05	
			10	—	0.05	—	0.00	0.05	—	0.05	
			15	—	0.05	—	0.00	0.05	—	0.05	
Output High Current	I_{OH}	V_{OH} = 4.6V, $V_{IN} = V_{SS}, V_{DD}$	5	−0.61	—	−0.51	−1.0	—	−0.42	—	mA
		V_{OH} = 2.5V	5	−2.5	—	−2.1	−4.0	—	−1.7	—	
		V_{OH} = 9.5V	10	−1.5	—	−1.3	−2.2	—	−1.1	—	
		V_{OH} = 13.5V	15	−4.0	—	−3.4	−9.0	—	−2.8	—	
Output Low Current	I_{OL}	V_{OL} = 0.4V, $V_{IN} = V_{SS}, V_{DD}$	5	0.61	—	0.51	1.2	—	0.42	—	
		V_{OL} = 0.5V	10	1.5	—	1.3	3.2	—	1.1	—	
		V_{OL} = 1.5V	15	4.0	—	3.4	12.0	—	2.8	—	
Input High Voltage	V_{IH}	V_{OUT} = 0.5V, 4.5V, $\|I_{OUT}\| < 1\mu A$	5	3.5	—	3.5	2.75	—	3.5	—	V
		V_{OUT} = 1.0V, 9.0V	10	7.0	—	7.0	5.5	—	7.0	—	
		V_{OUT} = 1.5V, 13.5V	15	11.0	—	11.0	8.25	—	11.0	—	
Input Low Voltage	V_{IL}	V_{OUT} = 0.5V, 4.5V, $\|I_{OUT}\| < 1\mu A$	5	—	1.5	—	2.25	1.5	—	1.5	
		V_{OUT} = 1.0V, 9.0V	10	—	3.0	—	4.5	3.0	—	3.0	
		V_{OUT} = 1.5V, 13.5V	15	—	4.0	—	6.75	4.0	—	4.0	
Input Current H Level	I_{IH}	V_{IH} = 18V	18	—	0.1	—	10^{-5}	0.1	—	1.0	μA
Input Current L Level	I_{IL}	V_{IL} = 0V	18	—	−0.1	—	-10^{-5}	−0.1	—	−1.0	
Quiescent Device Current	I_{DD}	$V_{IN} = V_{SS}, V_{DD}$	5	—	1	—	0.001	1	—	7.5	μA
			10	—	2	—	0.002	2	—	15	
			15	—	4	—	0.002	4	—	30	

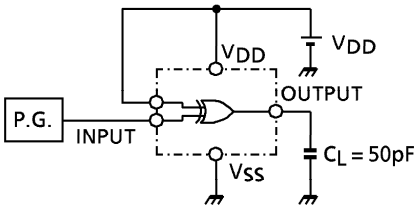
961001EBA2'

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C, V_{SS} = 0V, C_L = 50pF)

CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t_{TLH}	—	5	—	70	200	ns
			10	—	35	100	
			15	—	30	80	
Output Transition Time (High to Low)	t_{THL}	—	5	—	70	200	
			10	—	35	100	
			15	—	30	80	
Propagation Delay Time	t_{pLH} t_{pHL}	—	5	—	90	280	ns
			10		45	130	
			15		35	100	
Input Capacitance	C_{IN}	—		—	5	7.5	pF

CIRCUIT AND WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

CIRCUIT



WAVEFORM